APPLICATION FOR UNITED STATES LETTERS PATENT

TITLE: **AIRFLOW DIVERTER FOR UPRIGHT-TYPE VACUUM CLEANER AND UPRIGHT-TYPE VACUUM CLEANER HAVING THE SAME**

INVENTOR: **Byung-jo LEE**

ASSIGNEE: **SAMSUNG GWANGJU ELECTRONICS CO., LTD.**

BLANK ROME LLP
The Watergate
600 New Hampshire Avenue, N.W.
Washington, DC 20037
(202) 772-5800
(202) 572-8398 (facsimile)

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AIRFLOW DIVERTER FOR UPRIGHT-TYPE VACUUM CLEANER AND UPRIGHT-TYPE VACUUM CLEANER HAVING THE SAME

REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to co-pending Korean Patent Application No. 2003-69638 filed October 7, 2003, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to an upright-type vacuum cleaner, and in particular to, an airflow diverter for an upright-type vacuum cleaner that can perform a cleaning by selecting one of a floor suction brush for cleaning a floor and an auxiliary suction brush for cleaning an area other than the floor, and an upright-type vacuum cleaner provided with the same.

BACKGROUND OF THE INVENTION

[0003] A conventional upright-type vacuum cleaner includes a cleaner body 10 and a floor suction brush 20 installed on the bottom of the cleaner body 10 to be movable 20 along a floor, as shown in Fig. 1. The interior of the cleaner body 10 is generally divided into a dust collection chamber at the upper part thereof and a vacuum generation chamber at the lower part. A dust filter, or a cyclone dust collection device, is removably installed in the dust collection chamber and a vacuum generation device is installed in the vacuum generation chamber. The vacuum generation device comprises a motor and a fan for generating suction force.

[0004] With the upright-type vacuum cleaner constructed as described above, when the motor is operated, an intense suction force is created in the floor suction brush as caused by the suction

force and air entraining dust and various soils from a floor drawn into the cleaner body 10 through the floor suction brush 20. The drawn-in air is discharged to the vacuum generation chamber side through the dust filter, or the cyclone dust collection device installed in the dust collection chamber. The dust or various soils contained in air are trapped by the dust filter or the cyclone dust collection device and only the purified air is discharged to the outside through the vacuum generation chamber.

[0005] The conventional upright-type vacuum cleaner further includes an auxiliary suction brush 30 for cleaning a place that is difficult to be cleaned using the floor suction brush 20, e.g., a door frame, a window frame or a recessed place. The upright-type vacuum cleaner provided with the auxiliary suction brush 30 is equipped with a suction hose 40 on the exterior of the cleaner body 10 to connect the vacuum generation device and the floor suction brush 20, as shown in Fig. 1. The suction hose 40 comprises a flexible hose 41 and an extension tube 43, wherein one end of the flexible hose 41 is connected to the dust collection chamber via an inlet port 12 formed on the cleaner body 10. One end of the extension tube 43 is connected to the other end of the flexible hose 41, and the other end is connected to a connection hose 21 of the floor suction brush 20. The connection part between the other end of the extension tube 43 and the connection hose 21 of the floor suction brush 20 is designed for an easy connection. Therefore, as the suction hose 40 connects the inlet port 12 of the cleaner body 10 and the floor suction brush 20, air entraining dust or the like existing on a floor is drawn into the dust collection chamber through the floor suction brush 20 and the suction hose 40 by the suction force generated by the vacuum generation device.

[0006] When cleaning is performed using the auxiliary suction brush 30, the extension tube 43 of the suction hose 40 is removed from the connection hose 21 of the floor suction brush 20, and the auxiliary suction brush 30 is connected to the extension tube 43. A user can grasp a handle 45 provided on the extension tube 43 and clean a recessed place such as a door frame using the auxiliary suction brush 30.

[0007] As described above, the user can selectively perform the cleaning of a floor or a place other than the floor by removing the suction hose 40 from the floor suction brush 20 or connecting the suction hose 40 to the floor suction brush 20 in the conventional upright-type vacuum cleaner.

[0008] However, in the conventional upright-type vacuum cleaner, because the vacuum generation device and the floor suction brush 20 are connected via a long suction hose 40 in order to clean a place other than a floor, the flow passage, through which air entraining dust or the like, is drawn-in through the floor suction brush 20 is very long. Therefore, due to the resistance caused by the flow passage, the suction force decreases, and the dust suction efficiency of the floor suction brush 20 also decreases. In addition, because the frequency for electrostatically charged dust or soils that contacts with the suction hose 40 increases while air entraining dust and soils are flowing through the long suction hose 40, the dust suction efficiency of the floor suction brush 20 further decreases. Moreover, when cleaning is performed using the auxiliary suction brush 30, the cleaning is cumbersome because the extension tube 43 has to first be removed from the floor suction brush 20 to perform the cleaning, and removed again , to connect the extension tube 43 to the floor suction brush 20.

[0009] Thus, a heretofore un-addressed need exists in the industry to address the aforementioned deficiencies and inadequacies.

SUMMARY OF THE INVENTION

[0010] Accordingly, the present invention addresses the above-mentioned problems occurring in the prior art, and an object of the present invention is to provide an airflow diverter for an upright-type vacuum cleaner that allows the distance between a vacuum generation device and a floor suction brush to be reduced, thereby, improving the suction efficiency of the floor suction brush.

[0011] In addition, another object of the present invention is to provide an airflow diverter for an upright-type vacuum air cleaner that allows a communication direction of suction force from the vacuum generation device to be switched, so that the auxiliary suction brush can be easily and conveniently used.

[0012] Furthermore, another object of the present invention is to provide an upright-type vacuum cleaner, wherein the suction efficiency of the floor suction brush does not decrease although the auxiliary suction brush is employed, and the communication direction of the suction force from the vacuum generation device can be switched.

[0013] In order to achieve the above objects, an airflow diverter is provided for an upright-type vacuum cleaner that includes a vacuum generation device, a floor suction brush for drawing-in dust on a floor with a suction force generated by the vacuum generation device, and an auxiliary suction brush for drawing-in dust on a place other than the floor using the suction force

generated by the vacuum generation device wherein using the airflow diverter allows the vacuum generation device to selectively communicate with one of the floor suction brush and the auxiliary suction brush. The airflow diverter includes an inlet port formed on a cleaner body within which the vacuum generation device is received and is drawn into the inlet port by the suction force generated by the vacuum generation, a housing installed in the inlet port wherein the housing has a first opening communicating with the vacuum generation device, a second opening communicating with the floor suction brush, and a third opening communicating with the auxiliary suction brush. The airflow diverter further includes a rotary knob installed within the housing wherein if the rotary knob is turned to one direction by a predetermined angle, the rotary knob closes the third opening so that the vacuum generation device communicates with the floor suction brush, and, if the rotary knob is turned to the other direction by a predetermined angle, the rotary knob closes the second opening so that the vacuum generation device communicates with the auxiliary suction brush.

[0014] The housing may be formed as a hollow cylinder, one end of which is connected to the inlet port, and the second and third openings are formed on the outer periphery of the cylinder. The rotary knob may include a knob body installed to rotatably contact with the inner surface of the housing wherein the knob body is formed in a hollow cylindrical shape, one end of which is opened toward the first opening and the other end of which is closed. A communication hole is formed on the outer periphery of the knob body wherein if the knob body is turned in one direction, the communication hole communicates with the second opening, and, if the knob body is turned in the other direction, the communication hole communicates with the third opening.

[0015] It is preferable that the rotary knob further includes a handle for turning the knob body. In addition, the second opening may be extended to the floor suction brush. The second and third openings may be provided with hose connectors for connecting a communication hose from the floor suction brush and a hose from the auxiliary suction brush, respectively.

[0016] According to another embodiment of the present invention, an upright-type vacuum cleaner is provided comprising a vacuum cleaner body, within which a vacuum generation device and a dust collection chamber is located, a floor suction brush moving on a floor and drawing in air along with dust on the floor with a suction force generated by the vacuum generation device, and an auxiliary suction brush provided with a flexible hose and drawing in air along with dust on an area other than the floor with the suction force generated by the vacuum generation device. An inlet port is formed on the vacuum cleaner body, wherein air entraining dust is drawn into the inlet port. An airflow diverter is installed in the inlet port and allows the vacuum generation device to selectively communicate with either the floor suction brush or the auxiliary suction brush.

[0017] The airflow diverter may include a housing installed in the inlet port, wherein the housing has a first opening communicating with the vacuum generation device, a second opening communicating with the floor suction brush, and a third opening communicating with the auxiliary suction brush. A rotary knob is installed within the housing, wherein if the rotary knob is turned to one direction by a predetermined angle, the rotary knob closes the third opening so that the vacuum generation device communicates with the floor suction brush, and, if the rotary knob is turned to the other direction by a predetermined angle, the rotary knob closes the second opening so that the vacuum generation device communicates with the auxiliary suction brush.

The housing may be formed in a hollow cylinder, one end of which is connected to the inlet port, and the second and third openings are formed on the outer periphery of the cylinder.

[0018] In addition, the rotary knob may include a knob body installed to rotatably contact with the inner surface of the housing wherein the knob body is formed in a hollow cylindrical shape, one end of which is opened toward the first opening and the other end of which is closed. A communication hole is formed on the outer periphery of the knob body wherein if the knob body is turned in one direction, the communication hole communicates with the second opening, and if the knob body is turned in the other direction the communication hole communicates with the third opening. Herein, it is also preferable that the rotary knob further include a handle for turning the knob body. In addition, the second and third openings may be provided with hose connectors for connecting a communication hose from the floor suction brush and a hose from the auxiliary suction brush, respectively. When the inlet port is formed on the middle portion of the cleaner body, the second opening may be extended to the floor suction brush.

[0019] As described above, according to the airflow diverter for an upright type vacuum cleaner, it is possible to reduce the length of the hose for connecting the vacuum generation device and the floor suction brush. Therefore, the suction efficiency of the floor suction brush does not decrease. In addition, because it is possible to switch the direction for applying a suction force merely by turning a rotary knob, it is very convenient to use the auxiliary suction brush. Moreover, according to the present invention, it is possible to provide an upright-type vacuum cleaner, wherein the suction efficiency of a floor suction brush does not decrease although an auxiliary suction brush is employed and the auxiliary suction brush is conveniently used.

[0020] Other systems, methods, features, and advantages of the present invention will be or become apparent to one with skill in the art upon examination of the following drawings and detailed description. It is intended that all such additional systems, methods, features, and advantages be included within this description, be within the scope of the present invention, and be protected by the accompanying claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The above and other aspects, features and advantages of the present invention will be more apparent from the following detailed description taken with reference to the accompanying drawings. The components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present invention. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0022] Fig. 1 is a drawing of a perspective view showing a conventional upright-type vacuum cleaner;

[0023] Fig. 2 is a drawing of a perspective view showing an upright-type vacuum cleaner according to the present invention;

[0024] Fig. 3 is a drawing of a perspective view showing a state in which an airflow diverter is separated from the vacuum cleaner body according to an embodiment of the present invention;

[0025] Fig. 4 is a drawing of an exploded perspective view of the airflow diverter shown in Fig. 3;

[0026] Fig. 5 is a drawing of an exploded perspective view showing the construction of the airflow diverter shown in Fig. 3;

[0027] Fig. 6 is a drawing of a partial perspective view showing the state of the airflow diverter shown in Fig. 5;

[0028] Fig. 7 is a drawing of a partial perspective view showing state markings of a rotary knob of the airflow diverter shown in Fig. 3;

[0029] Fig. 8 is a drawing of a perspective view showing a state in which a hose connecter is assembled to the airflow diverter shown in Fig. 3;

[0030] Fig. 9 is a drawing of a perspective view showing another embodiment of an airflow diverter according to the present invention;

[0031] Fig. 10 is a drawing of a perspective view showing a state in which a vacuum generation device and a floor suction brush communicate with one another via the airflow diverter; and

[0032] Fig. 11 is a drawing of a perspective view showing a state in which a vacuum generation device and an auxiliary suction brush communicate with one another via the airflow diverter.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0033] Hereinbelow, embodiments of an airflow diverter for an upright-type vacuum cleaner according to the present invention, and an upright-type vacuum cleaner equipped with such an airflow diverter, will be described in detail with reference to the accompanying drawings.

[0034] Referring to Fig. 2, the inventive upright-type vacuum cleaner comprises a cleaner body 100, an airflow diverter 110, a floor suction brush 130 and an auxiliary suction brush 140. The interior of the cleaner body 100 is divided into a dust collection chamber (not shown) at the upper part and a vacuum generation chamber (not shown) at the lower part. A dust filter or a cyclone dust collection device for filtering dust or various soils entrained in drawn-in air is removably installed in the dust collection chamber. The vacuum generation chamber is provided with a vacuum generation device for generating a suction force, wherein the vacuum generation device includes a fan (not shown) for generating the suction force and a motor (not shown) for rotating the fan. The cleaner body 100 is formed with an inlet port 102 on the outer side of the dust collection chamber, wherein external air is drawn-in through the inlet port 102. The external air drawn-in through the inlet port 102 is discharged to the outside through the vacuum generation chamber after dust or various soils are removed from the air while it passes through the dust collection chamber.

[0035] The airflow diverter 110 is installed in the inlet port 102 of the cleaner body 100 and allows the vacuum generation device to selectively communicate with either the floor suction brush 130 or the auxiliary suction brush 140. The airflow diverter 110 includes a housing 111 installed in the inlet port 102 and a rotary knob 116 installed within the housing 111. The housing 111 includes a first opening 112 in communication with the vacuum generation device, a

second opening 113 in communication with the floor suction brush 130, and a third opening 114 in communication with the auxiliary suction brush 140. The rotary knob 116 installed within the housing 111, closes the third opening 114 and opens the second opening 113 so that the vacuum generation device communicates with the floor suction brush 130 when it is turned in one direction, and the rotary knob 116 closes the second opening 113 and opens the third opening 114 so that the vacuum generation device communicates with the auxiliary suction brush 140 when it is turned in the other direction. It is also possible to obtain the above-mentioned-operations by adjusting an angle for rotating the rotary knob 116 in the one direction.

[0036] An embodiment of the airflow diverter is shown in Figs. 3-6. Referring to the drawings, the airflow diverter 110 includes a housing 111 installed in an inlet port 102 and connecting a floor suction brush 130 and an auxiliary suction brush 140 with a vacuum generation device. A rotary knob 116 is installed within the housing 111. The housing 111 includes a hollow cylinder 115 with the opposite ends opened, wherein one end 112 is a first opening connected to the inlet 102 of the cleaner body 100, and the rotary knob 116 is assembled to the other end 115a. The external periphery of the hollow cylinder 115 is formed with a second opening 113 and a third opening 114. The second opening 113 extends downwardly so that it directly connects to a connection hose 131 of the floor suction brush 130. The third opening 114 is formed so that the auxiliary suction brush 140 connects to the third opening 114.

[0037] The rotary knob 116 includes a knob body 117 formed in a hollow cylindrical shape, one end of which is closed and the other end of which is open, and a communication hole 118 formed on the outer periphery of the knob body to correspond to the holes 113a, 114a of the second opening 113 and third opening 114 in size. The knob body 117 rotates within the hollow cylinder

115 of the housing 111, wherein the knob body 117 is assembled so that an opened end 117b is oriented toward the first opening 112 of the housing 111. A handle 119 is provided on the outside of the closed end 117a of the knob body 117 so that the rotary knob 116 can be easily rotated. The communication hole 118 is formed so that the outer periphery of the knob body 117 closes the third opening 114 of the housing 111 when it is oriented toward the second opening 112 of the housing 111, and the outer periphery of the knob body 117 closes the second opening 112 of the housing 111 when it is oriented toward the third opening 114.

[0038] It is preferable to have markings 120, 121 such as "FLOOR" and "HOSE" on the housing 111 as shown in Fig. 7 so that the user may easily recognize the position of the communication hole 118 of the rotary knob 116. There, the "FLOOR" marking 120 indicates a state in which the communication hole 118 of the rotary knob 116 is oriented toward the second opening 113 and thus the floor suction brush 130 is connected to the vacuum generation device, The "HOSE" marking 121 indicates a state in which the communication hole 118 is oriented toward the third opening 114 and thus, the auxiliary suction brush 140 is connected to the vacuum generation device. In addition, it is preferable to provide a seal between the rotary knob 116 and the housing 111 in order to prevent the leakage of air.

[0039] The floor suction brush 130 is provided on the bottom of the cleaner body 100 and draws-in dust and various soils on the floor. The back of the floor suction brush 130 is provided with a communication hose 131 adapted to connect with the housing 111 of the airflow diverter 110. The communication hose 131 can be directly connected to the second opening 113 of the housing 111. However, it is preferable that the communication hose 131 is connected to the second opening 113 via a hose connector 125 as shown in Fig. 8.

[0040] The auxiliary suction brush 140 includes a flexible hose 142, an extension tube 144 and an auxiliary suction brush 146. A seat 105 for fixing the auxiliary suction brush 140 is provided on the back of the cleaner body 100. One end of the flexible hose 142 is connected to the third opening 114 of the housing 111, and the other end is connected to the extension tube 144. One end of the extension tube 144 is connected to the auxiliary suction brush 146 and the outer periphery of the extension tube 144 is provided with a handle 147. The flexible hose 142 can directly connect to the third opening 114 of the housing 111. In one embodiment, the flexible hose 142 is connected to the third opening 114 of the housing 111 using the hose connector 123 as shown in Fig. 8.

[0041] Another embodiment of the airflow diverter is illustrated in Fig. 9, in which the second opening 113' of the housing 111 is shortened like the third opening 114. In that case, it is possible to connect the second opening 113' of the housing 111 and the floor suction brush 130 by increasing the length of the communication hose 131 of the floor suction brush 130 or using a separate hose (not shown). Hereinbelow, description will be made as to operation of the inventive airflow diverter for an upright-type vacuum cleaner and an upright-type vacuum cleaner equipped with the same.

[0042] When cleaning a floor, the user turns the handle 119 of the rotary knob 116, so that the handle 117 is oriented toward the "FLOOR" marking 120. If the handle 117 is positioned at the "FLOOR" marking 120, the communication hole 118 of the rotary knob 116 is oriented to the second opening 113 of the housing 111 and the outer periphery of the knob body 117 closes the third opening 114, as shown in Fig. 10. Then, the floor suction brush 130 and the vacuum generation device communicates with each other through the first opening 112 and the second

opening 113 (refer to the arrow in Fig. 10) If the motor is operated in that state, dust and various soils on a floor are drawn-in through the floor suction brush 130 by the suction force generated by the vacuum generation device, and then flow into the inlet port 102 of the cleaner body 100 through the communication hose 131, the second opening 113, and the first opening 112. Dust and soils entrained in the air flowing into the inlet port 102 of the cleaner body 100 are filtered by the dust filter or the cyclone dust collection device installed in the dust collection chamber, and the air purified thereby is discharged to the outside through the vacuum generation device.

[0043] If it is intended to clean a door frame, a window frame or a recessed place other than a floor, the user turns the rotary knob handle 119 of the airflow diverter 110 to the "HOSE" marking 121. The communication hole 118 of the rotary knob 116 is oriented toward the third opening 114 and the outer periphery of the knob body 117 closes the second opening 113, as shown in Fig. 11. Therefore, the vacuum generation device communicates with the auxiliary suction brush 140 and the connection with the floor suction brush 130 is shut off. If the vacuum device is operated in this state, dust or various soils can be drawn into an auxiliary brush 146 of the auxiliary suction brush 140 by the suction force generated by the vacuum generation device. The dust or soils drawn-into the auxiliary brush 146 flow into the inlet port 102 provided on the cleaner body 100 through the extension tube 144 and the flexible hose 142 of the auxiliary suction brush 140. Dust or soils contained in air drawn into the inlet port 102 of the cleaner body are filtered by the dust filter or the cyclone dust collection device, and air purified thereby is discharged to the outside through the vacuum generation device. If the user wishes to clean using the floor using suction brush 130 again, it is sufficient to turn the rotary knob 116 of the airflow diverter 110 to the "FLOOR" marking 120. As

described above, if the inventive airflow diverter for an upright-type vacuum cleaner is used, it is possible to differentiate hoses for connecting a vacuum device with a floor suction brush and with an auxiliary suction brush. Therefore, it is possible to reduce the length of the hose for connecting the vacuum generation device and the floor suction brush. Hence, it is possible to reduce the airflow resistance caused by the airflow passage between the floor suction brush, and the vacuum generation device is reduced, but the suction efficiency of the floor suction brush does not decrease. Moreover, because the auxiliary suction brush is configured to use a hose separated from the floor suction hose and it is possible to switch the direction for applying suction force merely by turning a rotary knob, it is convenient to use the auxiliary suction brush.

[0041] While the preferred embodiments of the present invention have been shown and described with reference to the preferred embodiments thereof in order to illustrate the principles of the present invention, the present invention is not limited to the disclosed embodiments. It will be understood that various modifications and changes can be made by those skilled in the art without departing from the spirit and scope of the invention as defined by the appended claims.

[0044] Therefore, it shall be considered that such modifications, changes and equivalents thereof are all included within the scope of the present invention.